

## MultiTek® Chlorine in Naphtha by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection

- **Rapid and Accurate Chlorine Determination**
- **Fully Automated Combustion System**
- **Excellent Sensitivity and Stability**

### Keywords:

**MultiTek®, Pyrohydrolysis, Chlorine, Chloride, Combustion IC, CIC**

## INTRODUCTION

The accurate and rapid determination of chlorine content in naphtha and related materials is important to refineries, processing plants, and storage facilities. Chlorine compounds present in the naphtha or other fractions are generally corrosive and can severely damage processing equipment. Some chlorine compounds are poisonous to catalysts and in the case of some fractions, the chlorine content may render the material unsuitable for further processing.

This procedure analyzes naphtha samples which undergo pyrohydrolysis at 1050°C according to the reaction outlined below.



After combustion, the exhaust passes through a condenser and then a scrubber solution composed of UHP 18.2 MΩ water and a phosphate (Na<sub>2</sub>HPO<sub>4</sub>) internal standard which collects the HCl. Once the sample preparation process is complete, the solution is transferred from the MultiTek® to an injection system on the Ion Chromatograph (IC) for chloride analysis.

## EXPERIMENTAL CONDITIONS

### • Instrumentation

Antek MultiTek® Horizontal, Antek Model 740 boat inlet system, Antek Model 735 syringe drive, Antek Model 748 Autosampler and a background suppressed IC system.



### • Instrument Parameters

Sample Volume (µl)	50
IC Sample Loop (µl)	100
GFC1- Ar/He (ml/min)	130
GFC2- Pyro O2 (ml/min)	450
GFC4- Carrier O2 (ml/min)	30
Furnace (°C)	1050
Sample Burn Time (mm:ss)	5:35
735 Speed	1600
735 Carriage plate distance (cm)	20

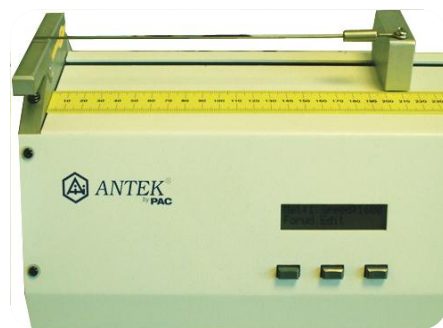


Figure 1. Model 735 Carriage Distance

## Standards/Calibration

Calibration was performed by analyzing chlorobenzene in isooctane standards 0.1 – 2.2 mg Cl/L as shown in Figure 2.

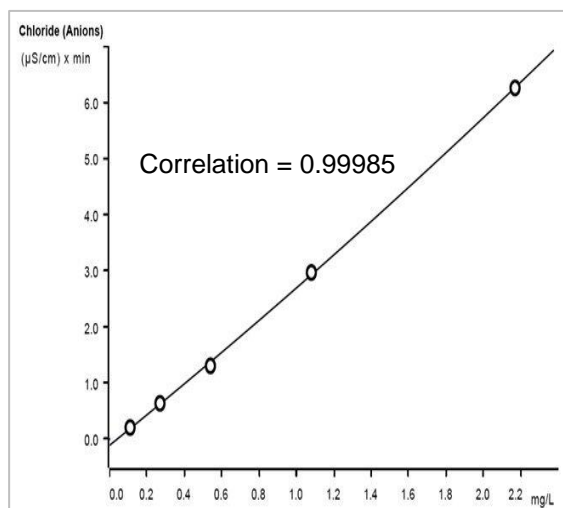


Figure 2. Calibration Results for Chlorine

## Trace Level Analysis

A non-spiked naphtha sample was prepared and analyzed in triplicate. The results shown in Table 1 and a comparison between the 0.1 mg/L calibration standard and one of the naphtha runs is shown in Figure 4.

Injection	mg Cl/L
1	0.158
2	0.164
3	0.156
<b>Average</b>	<b>0.159</b>

Table 1. Cl results in non-spiked Naphtha

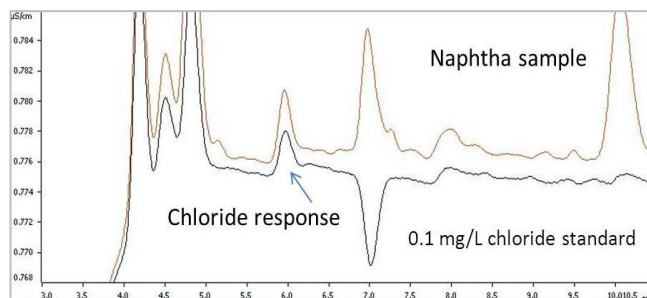


Figure 4. Comparison of 0.1 mg Cl/L and the non-spiked Naphtha Sample

## Repeatability

A naphtha sample was spiked to ~1 mg Cl/L and analyzed 20 times with the results shown in Figure 3.

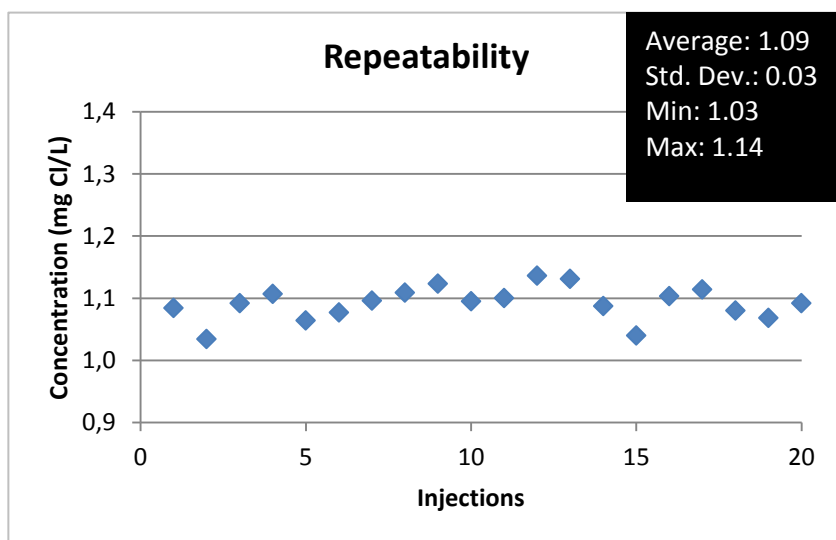


Figure 3. Repeatability at 1 mg Cl/L Chloride in Naphtha

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## CONCLUSION

These results demonstrate that the MultiTek Analyzer combined with Ion Chromatography provides a sensitive, automated and reliable analysis of chlorine in naphtha. This analysis will allow the refinery and other processing and storage facilities to monitor process streams, storage tanks and other systems for unacceptable levels of chlorine to prevent corrosion and to provide catalyst protection.

The Antek MultiTek® is the only instrument on the market that combines sulfur, nitrogen, and halides analysis all in one. Compact, powerful, automated, and able to analyze gas, liquid, or solid samples, it's the perfect solution to today's increasing demand worldwide for fast, accurate detection and analysis of contaminants, and corrosive elements. Because MultiTek® delivers precise results with high sensitivity and unmatched versatility, it's a valuable process optimization tool that will deliver faster ROI and a better bottom line.